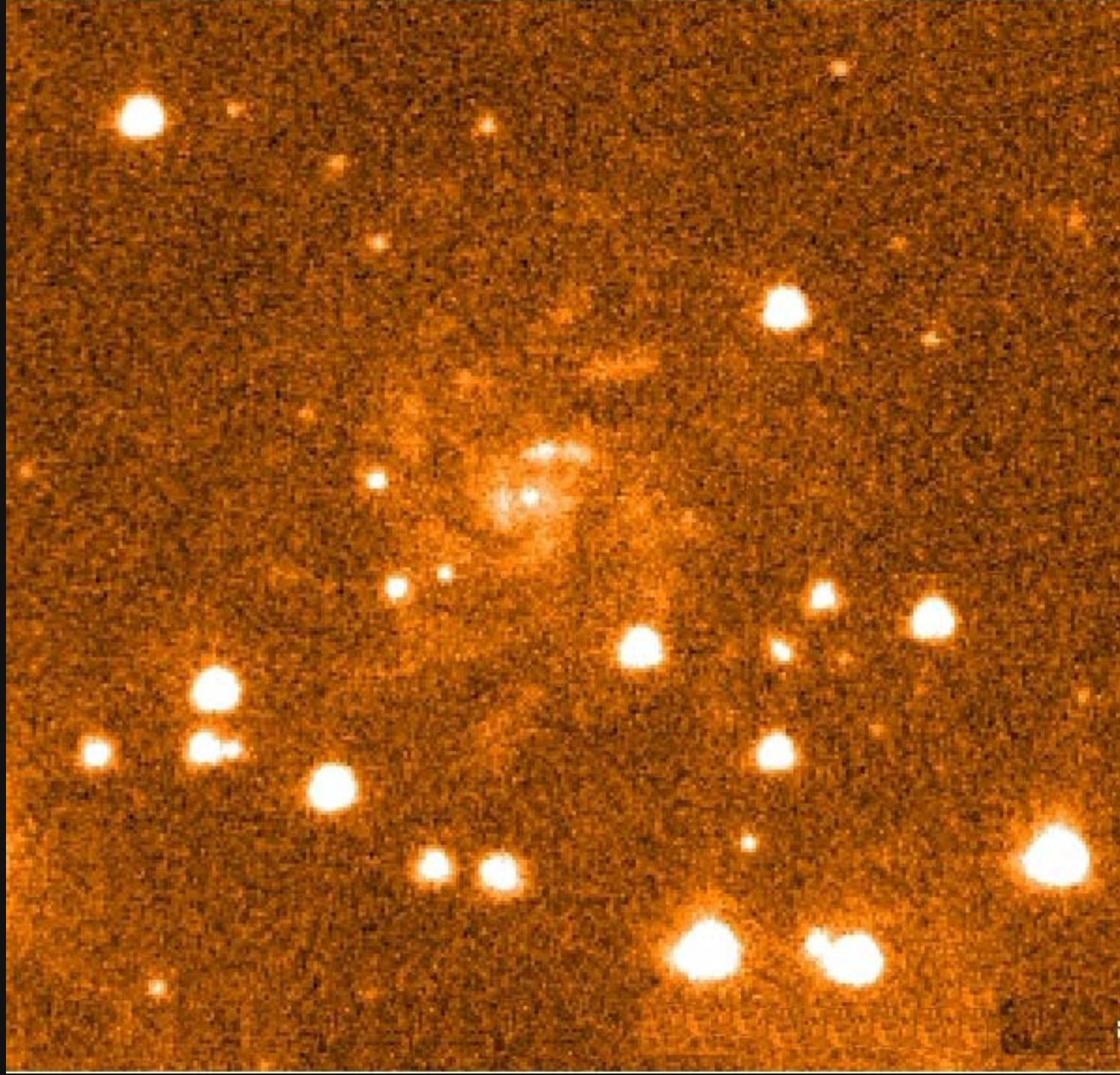
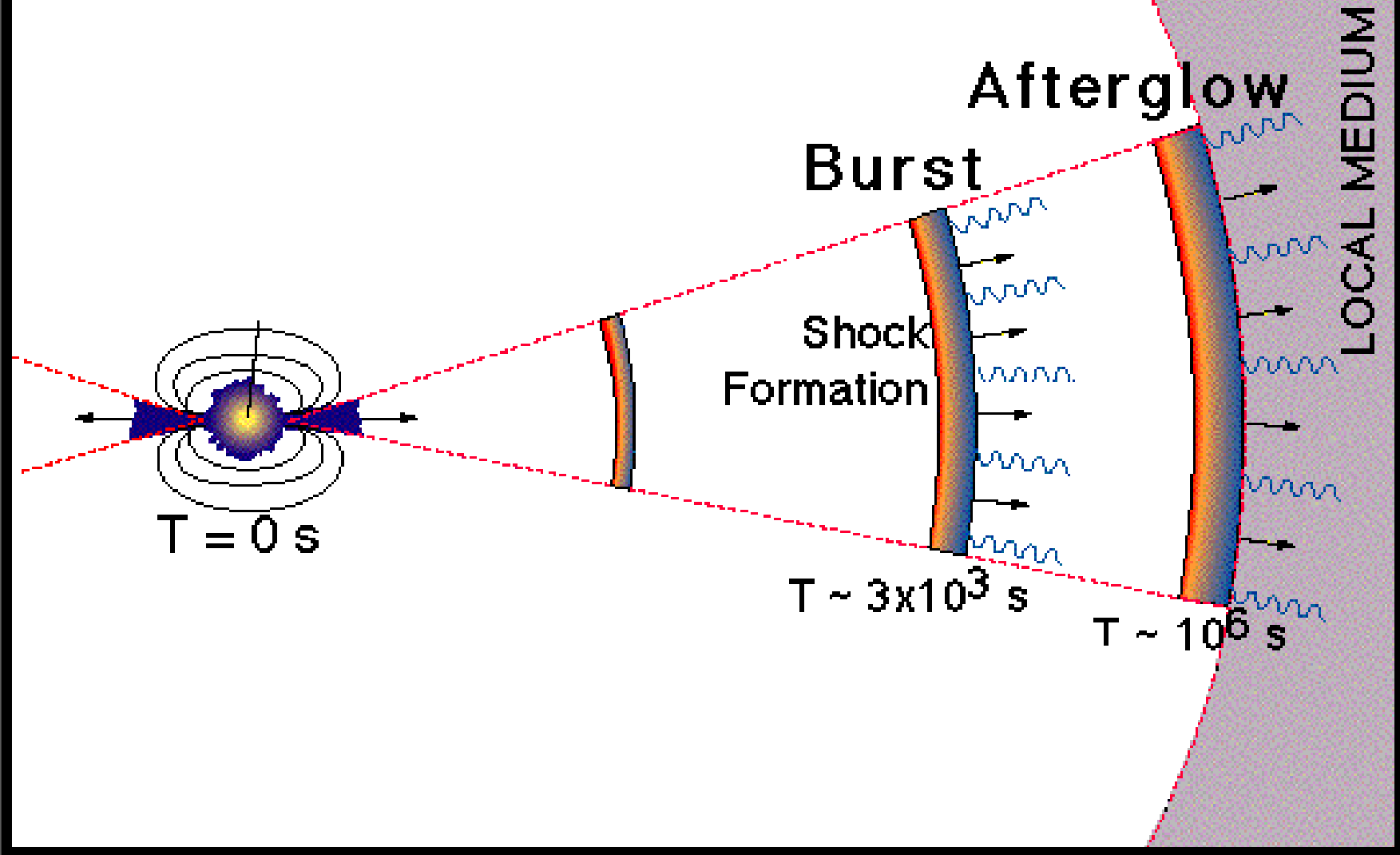


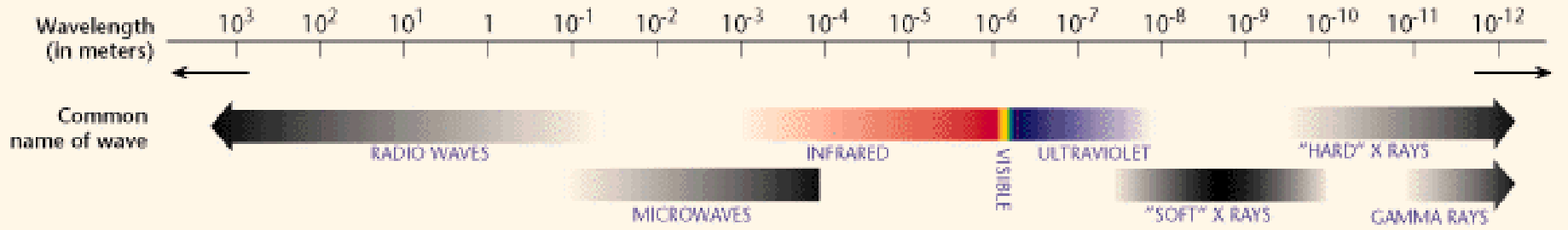
# **Instruments for Gamma-ray Burst Observations**

*Arne Rau, MPE*



# GRB FIREBALL MODEL





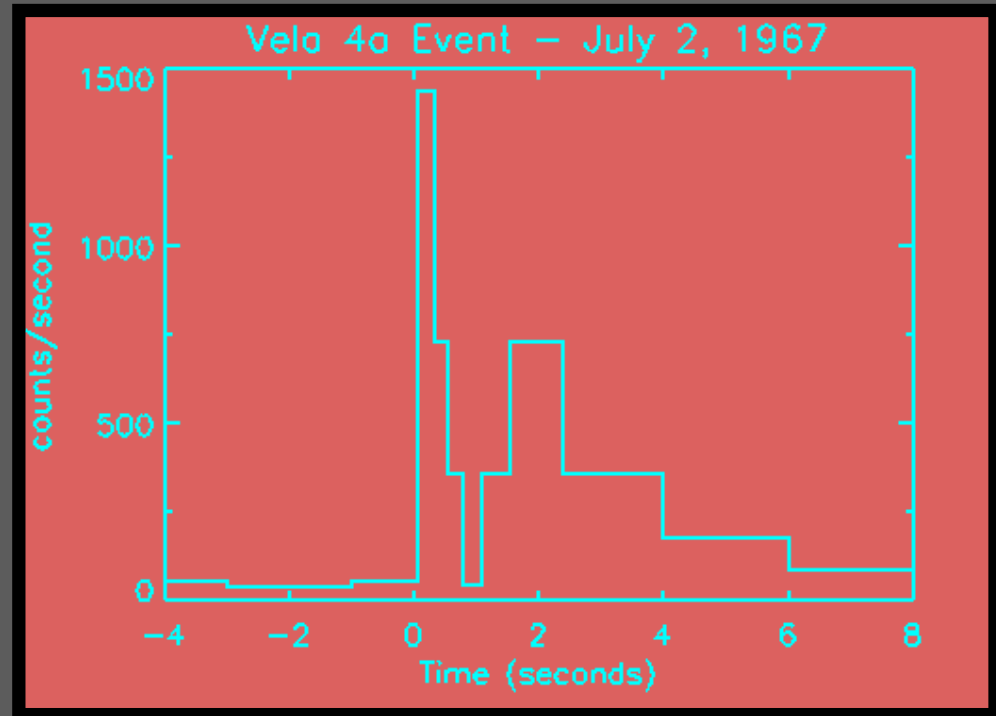
**Prompt  
Emission**

**Afterglow**

**Host  
galaxy**

# **Instruments for Gamma-ray Burst *Detections***

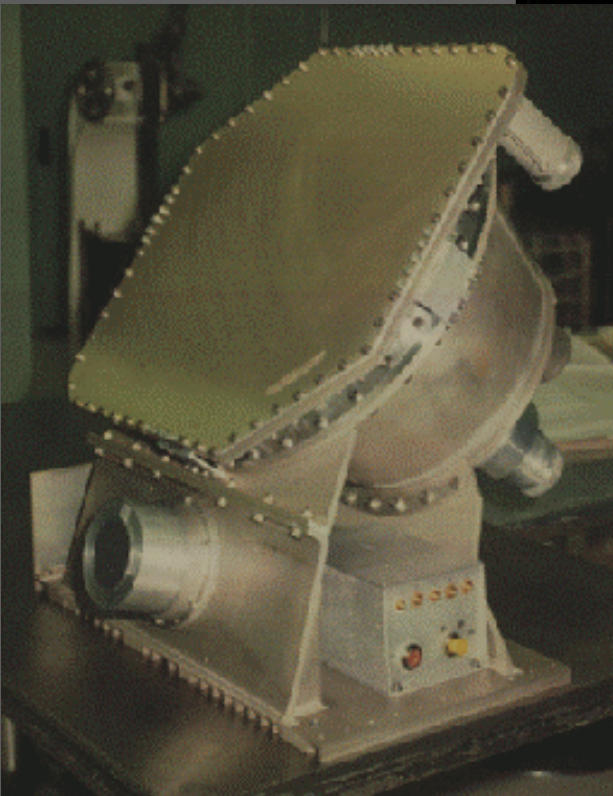
# The **Vela** satellites and the Discovery of GRBs



Klebesadel, Strong & Olson

# Burst And Transient Source Experiment

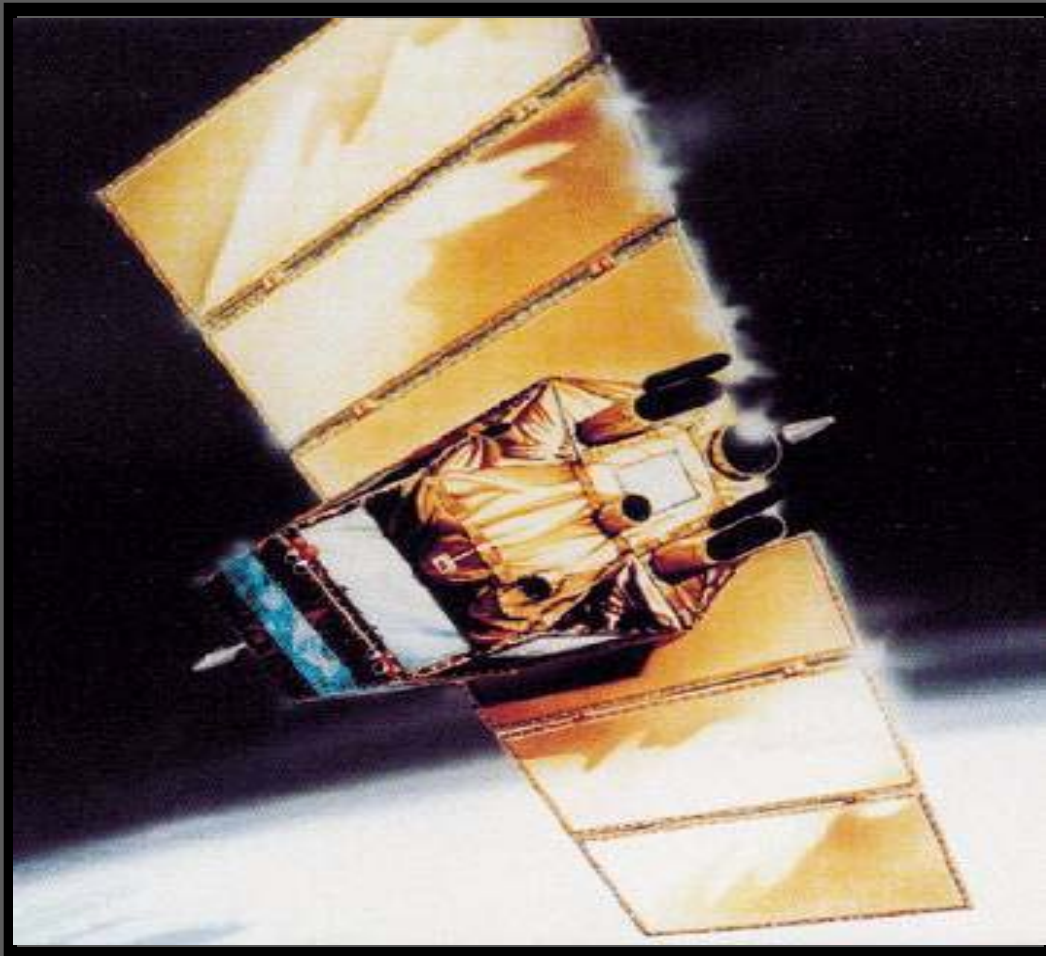
CGRO



- 1991-2000
- 20 - 2000 keV
- 2704 GRBs

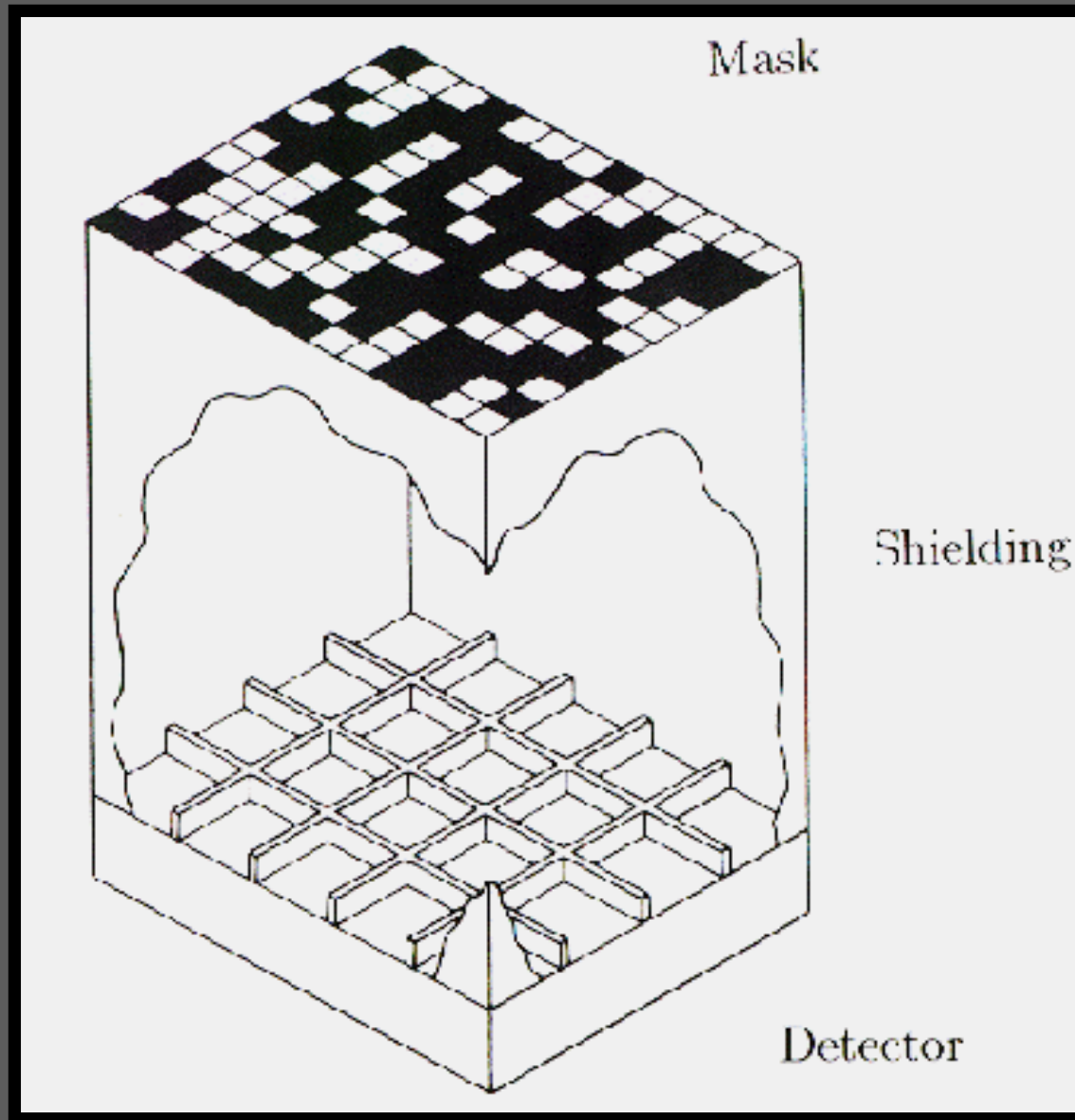
Paciesas  
et al. 1999

# BeppoSatellite per Astronomia X

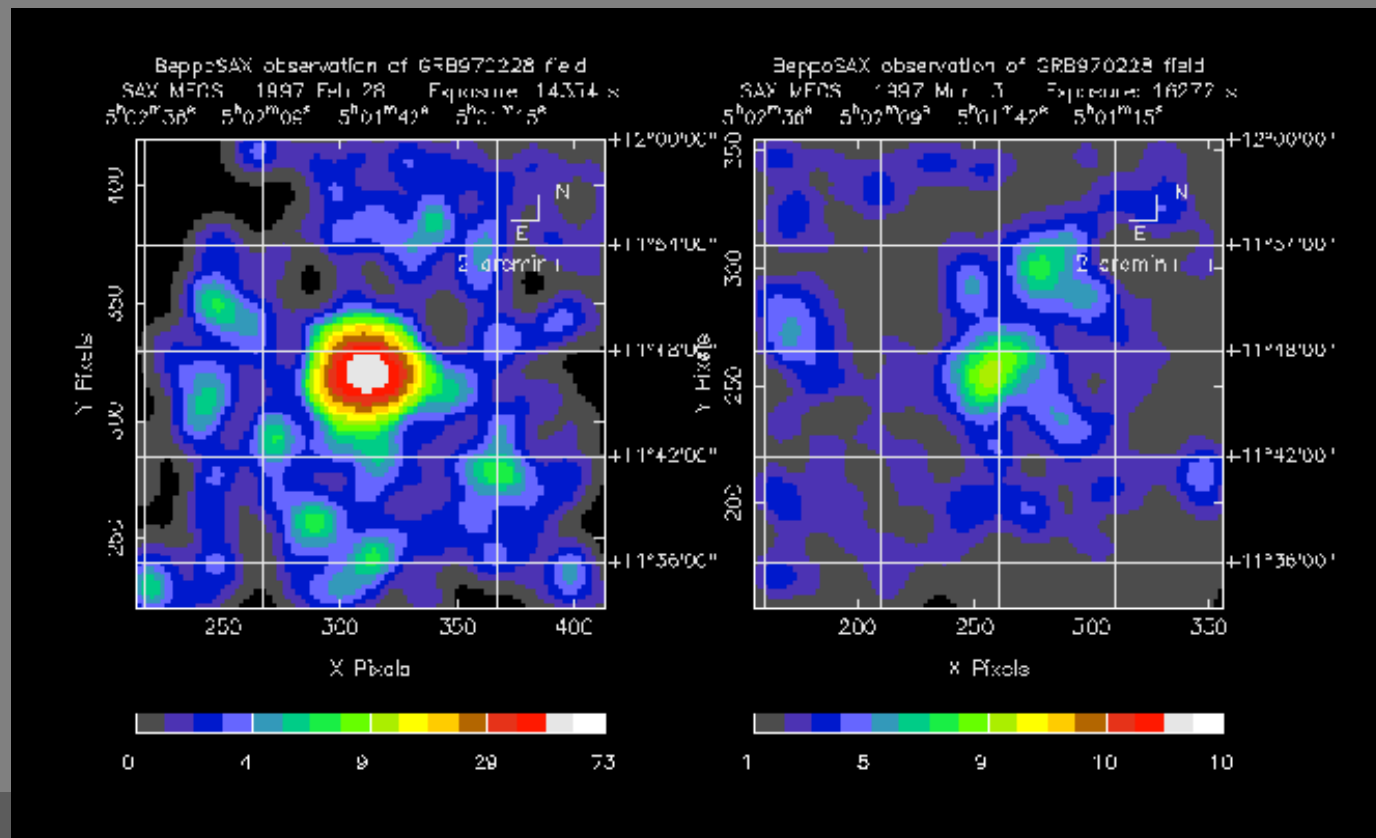


- 1996-2003
- 1.5 - 600 keV
- 1st localizations

# Coded Mask Principle



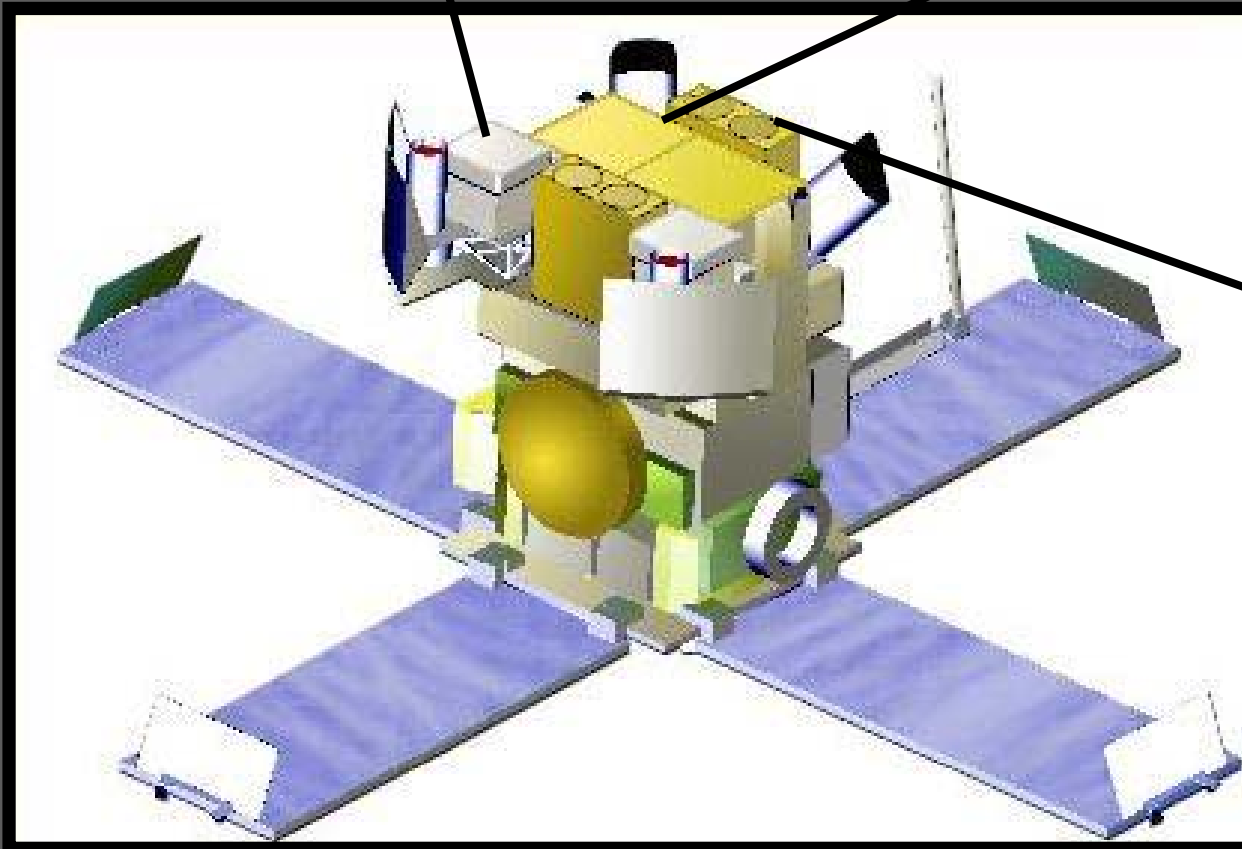
# BeppoSatellite per Astronomia X



# High Energy Transient Explorer - 2

**SXC: 0.5-14keV**

**WXM: 2-25keV**

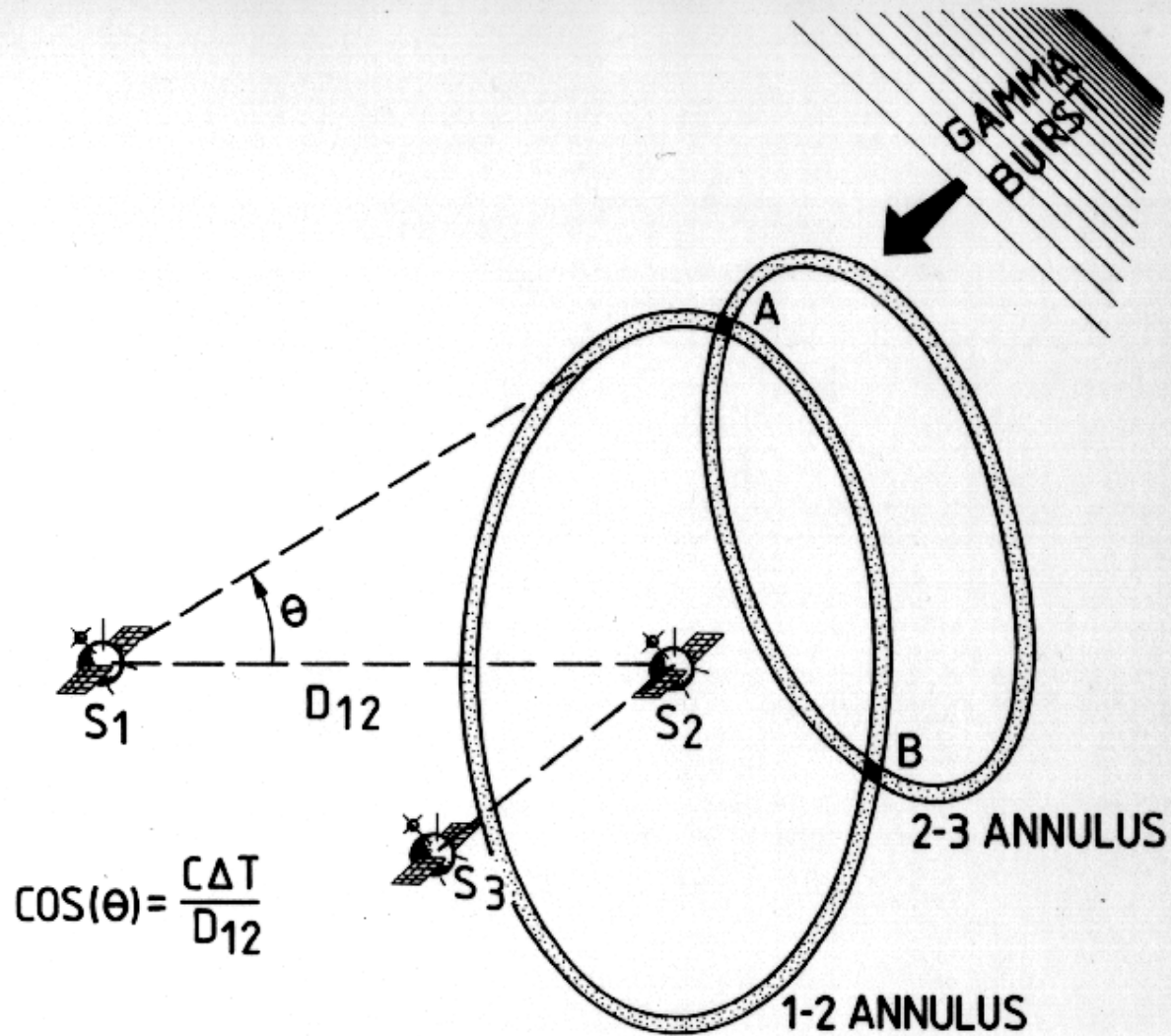


**FREGATE:  
6-1000keV**

# Swift - 2004



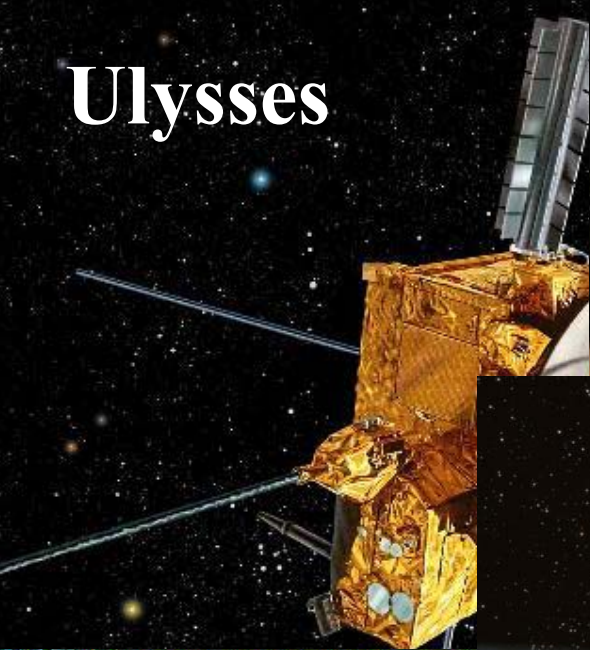
# Triangulation Method



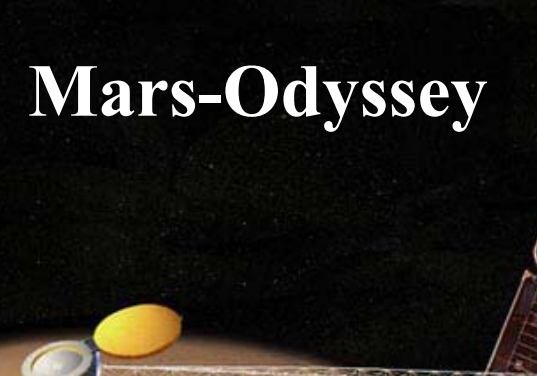
THE "TRIANGULATION" METHOD

# 3rd InterPlanetary Network (K. Hurley)

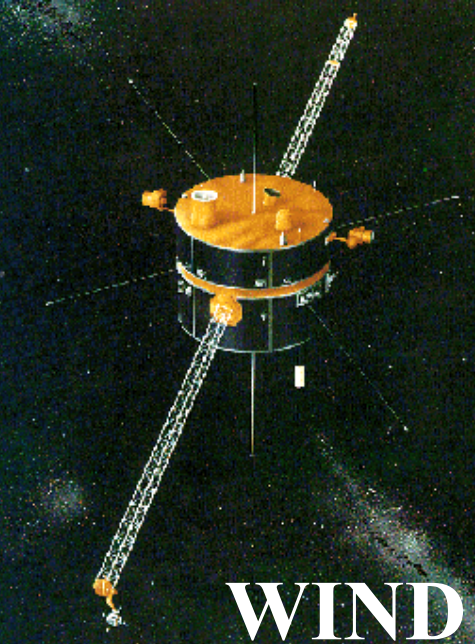
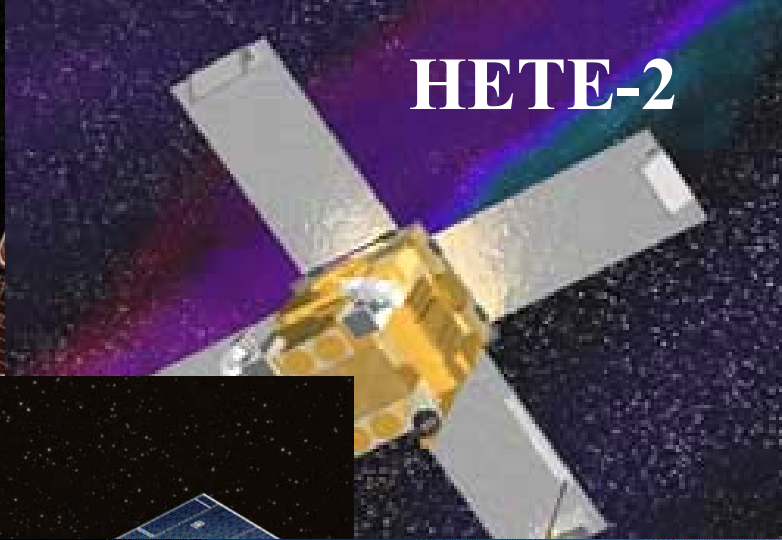
**Ulysses**



**Mars-Odyssey**



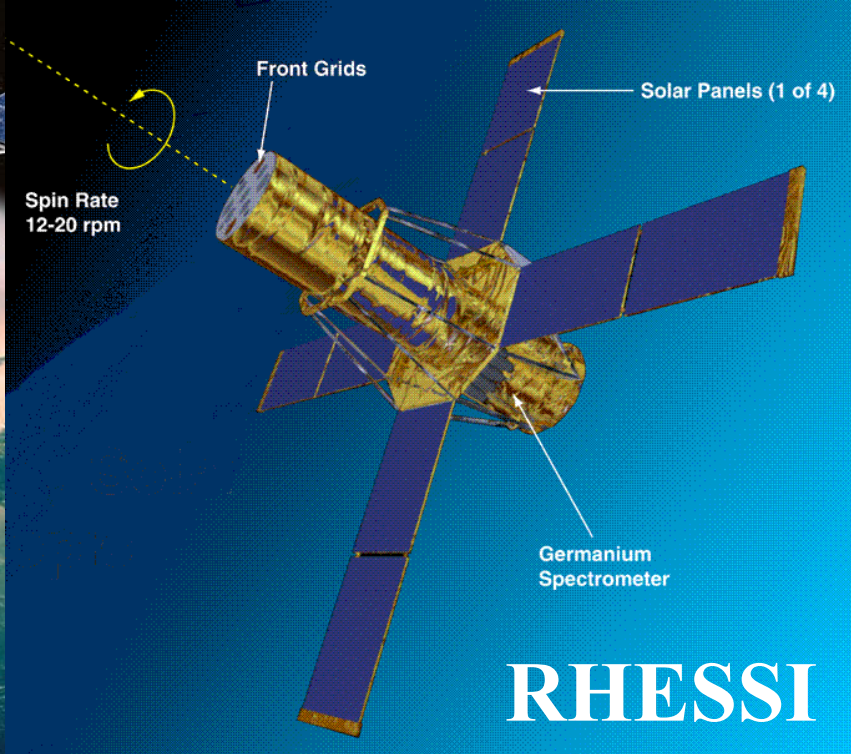
**HETE-2**



**WIND**



**INTEGRAL**



**RHessi**

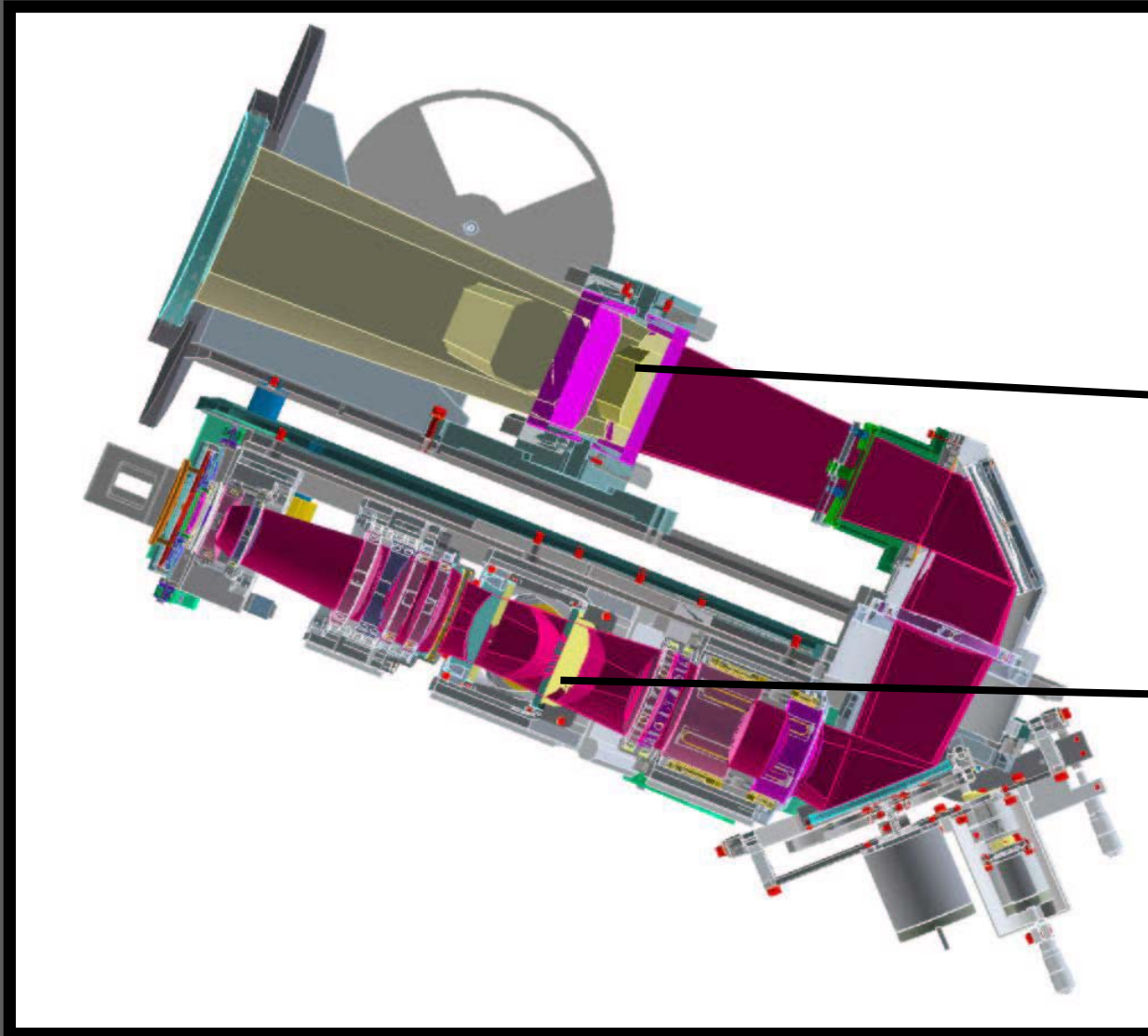


# Livermore Optical Transient Imaging System



PI: Hye-Sook Park (LLNL)

# Gamma-Ray Burst Optical NearIR Detector



**4 x Optical**

**3 x IR**

PI: Jochen Greiner (MPE)

# 1st GROND deployment

